Oxammite $(NH_4)_2C_2O_4 \cdot H_2O$

Crystal Data: Orthorhombic. *Point Group:* 222. Rare in crystals, typically in lamellar and pulverulent masses.

Physical Properties: *Cleavage:* On {001}, distinct. Hardness = 2.5 D(meas.) = ∼1.5 D(calc.) = 1.541 Soluble in H_2O.

Optical Properties: Transparent to opaque. *Color:* Colorless to pale yellow; colorless in transmitted light.
Optical Class: Biaxial (–). *Orientation:* $X = c$; $Y = a$; $Z = b$. *Dispersion:* $r < v$, distinct.
$\alpha = 1.438$ $\beta = 1.547$ $\gamma = 1.595$ 2V(meas.) = 62°

Cell Data: *Space Group:* $P2_12_12$ (synthetic). $a = 8.035$ $b = 10.32$ $c = 3.801$ Z = 2

X-ray Powder Pattern: Guañape Islands, Peru.
6.37 (10), 2.88 (8), 2.68 (8), 2.60 (8), 3.83 (7), 3.08 (7), 3.28 (6)

Chemistry:

	(1)	(2)	(3)
C_2O_4	53.30	61.93	54.97
NH_4	21.95	25.39	22.53
H_2O	24.75	12.68	22.50
Total	[100.00]	100.00	100.00

(1) Guañape Islands, Peru; recalculated to 100% after deduction of organic material 5.5%.
(2) $(NH_4)_2C_2O_4 \cdot H_2O$. (3) $(NH_4)_2C_2O_4 \cdot 2H_2O$.

Occurrence: Derived from bird or bat guano; in subfossil bird eggs and on subfossil birds.

Association: Mascagnite (Guañape Islands, Peru).

Distribution: From the Guañape Islands, south of Trujillo, Peru. In Petrogale Cave, near Madura, Western Australia. On Hamar an Nafur Island, Gulf of Masirah, Oman.

Name: As an OXalate of AMMonia.

Type Material: University of Virginia, Charlottesville, Virginia, apparently lost in a fire in 1916; Yale University, New Haven, Connecticut, USA.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 1103–1104. (2) Frondel, C. (1950) Notes on arcanite, ammonian aphthitalite and arcanite. Amer. Mineral., 35, 596–598. (3) Winchell, H. and R.J. Benoit (1951) Taylorite, mascagnite, aphthitalite, lecontite, and oxammite from guano. Amer. Mineral., 36, 590–601. (4) Taylor, J.C. and T.M. Sabine (1972) Isotope and bonding effects in ammonium oxalate monohydrate, determined by the combined use of neutron and X-ray diffraction analyses. Acta Cryst., 28, 3340–3351. (5) (1957) NBS Circ. 539, 7, 5.